Space Weather Forecast

Issued on Monday, 01 January 2024 at 01:22 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate flares, slight chance of Strong flares. Slight chance G1-Minor storms from coronal hole fast wind onset day 1 (1st Jan).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High with a single strong flare from a region on the northeast limb 31/2155 UTC. There are four numbered sunspots and a small newly emerged spot in the northwest. The most notable region is the aforementioned, potentially returning ex-AR3514. This is a moderately sized region, but appears to have mixed polarities within very close penumbra regions in a north/south alignment. Further spots or regions are also likely from over the east limb. The other regions remain smaller, simpler and either stable or decaying.

There were several coronal mass ejections observed through the period, with two or three perhaps giving Earth glancing blows later in the period and at least two other coronal mass ejections awaiting further imagery or computation.

Solar Wind / Geomagnetic: Background wind speeds were observed with a flat trend. Interplanetary Magnetic Field (IMF), Bt, was generally weak. The north-south component, Bz, was also weak. Geomagnetic activity remained Quiet (Kp 0-1).

Energetic Particles / Solar Radiation: Count rate of energetic particles (high energy protons) was mostly at background, though a minor response post strong flare was observed to end the period. No solar radiation Storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low activity is expected, but with a chance of rising to Moderate with isolated M-flares possible, especially later in the period when a returning region is likely to rotate onto the visible disc.

Solar Wind / Geomagnetic Activity: There are several weak, potentially glancing coronal mass ejections that may have a very minor influence later in the period. Slow wind conditions initially, with background speeds, are expected to become elevated on day 1 (01 Jan) due to the onset of coronal hole fast winds. Elevated winds are likely to persist day 2 before easing day 3 (02-03 Jan). coronal mass ejection influences may bring further spells of elevated solar winds at Earth, though this remains low confidence.

Quiet geomagnetic activity is expected to start, becoming Unsettled with a chance of Active intervals and a slight chance of G1 Minor storms on day 1 (01 Jan), before easing to Quiet with Unsettled intervals day 2 (02 Jan). However, Active intervals remain possible days 2-4 (02-04 Jan) from any very slight CME enhancement/s that may occur.

Energetic Particles / Solar Radiation: Count rate of energetic particles (high energy protons) may respond to flares in the short term but should remain below S1 storm levels, with no solar radiation storms expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	5	20	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	50	50	50	50
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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